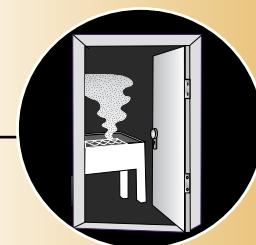
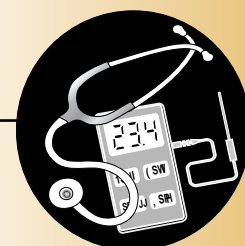


Benzene

Chapter 296-849 WAC
March 2005 Edition

Washington Industrial Safety & Health Act



Other Rules that may apply to your workplace

- The WISHA Safety and Health Core Rules, Chapter 296-800 WAC, contain the basic requirements that apply to most employers in Washington. They also contain:
 - An Introduction that lists important information you should know, including a section on building, fire and electrical codes.
 - A Resource section that includes a complete list of all WISHA rules and a directory of the Labor and Industries (L&I) offices.
- Other WISHA rules may apply to you, depending on the activities and operations of your workplace. Contact your local L&I office if you're uncertain about which WISHA requirements apply to you.
- To go online to access all the Safety and Health Rules: <http://www.lni.wa.gov/wisha>
- If you would like to receive e-mail notification of rule updates, please register for the Standards Listserv on the WISHA web site at <http://www.lni.wa.gov/home/listservs.htm>
- For a CD or paper copy contact us by:

Mail: Department of Labor and Industries
P.O. Box 44620
Olympia, WA 98504-4620

Telephone: 1-800-4BE-SAFE (1-800-423-7233)

Scope



This chapter applies to **all** occupational exposure to benzene.



Definition:

Exposure is the contact an employee has with benzene, whether or not protection is provided by respirators or other personal protective equipment (PPE). Exposure can occur through various routes of entry such as inhalation, ingestion, skin contact, or skin absorption.



Exemptions:

This chapter does **not** apply to any of the following:

- Liquids, vapors, mixtures in containers or pipelines, and gas in natural gas processing plants when benzene content is 0.1% or less.
- Gasoline and other fuels containing benzene once they leave the final bulk wholesale facility and are being:
 - Transported
 - Sold
 - Distributed
 - Stored
 - Dispensed either:
 - Outdoors
 - or**
 - Indoors 4 hours or less a day.
 - Used as a fuel.
- Laboratories subject to the requirements in Hazardous chemicals in laboratories, WAC 296-62-400, the General Occupational Health Standards, Chapter 296-62 WAC
- Oil and gas drilling, production, and servicing operations
- Solid materials that contain only trace amounts of benzene
- Coke ovens.

– Continued–



Benzene

WAC 296-849-100

Scope

WAC 296-849-100 (Continued)

All requirements in this chapter will **not** apply to every workplace with an occupational exposure. The following will show you which requirements apply to your workplace.

Step 1: If any of your work tasks are listed in Table 1, follow Table 1.

- Go to Step 2a if you have additional work tasks or other exposures that aren't covered in Table 1.

Table 1
Requirements that Apply to Specific Tasks

If employees do any of the following	Then the only requirements in this chapter that apply to those tasks are
Load and unload benzene at bulk storage facilities that use vapor control systems for all loading and unloading operations	<ul style="list-style-type: none"> • The labeling requirement found in Preventive practices, WAC 296-849-11010 • This requirement found in Training, WAC 296-849-11050: <ul style="list-style-type: none"> – Make sure training and information includes specific information on benzene for each hazard communication training topic. For the list of hazard communication training topics, go to the Safety and Health Core Rules, Chapter 296-800 WAC, and find Inform and train your employees about hazardous chemicals in your workplace, WAC 296-800-17030.
Perform tasks around sealed transport pipelines carrying gasoline, crude oil, or other liquids containing more than 0.1% benzene	
Work with, or around, sealed containers of liquids containing more than 0.1% benzene	<ul style="list-style-type: none"> • Emergency requirements found in Medical evaluations, WAC 296-849-12030. • Requirements found in Medical records, WAC 296-849-12080.
	<ul style="list-style-type: none"> • Respirator requirements found in Respirators, WAC 296-849-13045.

-Continued-

**WAC 296-849-100 (Continued)**

Step 2a: Follow requirements in the basic rules sections, WAC 296-849-11010 through 296-849-11090, for tasks **not** listed in Table 1.

- This includes completing an exposure evaluation, as specified in Exposure evaluations, WAC 296-849-11030, to:
 - Obtain employee 15-minute and 8-hour exposure monitoring results of airborne benzene
 - and**
 - Determine if employee exposure monitoring results are above, at, or below these values:
 - 8-hour time-weighted average (TWA₈) 1 parts per million (ppm).
 - 15-minute short-term exposure limit (STEL) 5 ppm.
 - 8-hour action level (AL) 0.5 ppm.

Step 2b: Use employee exposure monitoring results from Step 2a and follow Table 2 to find out which additional sections of this chapter apply to your workplace.

Table 2
Section Application

If employee exposure monitoring results are	Then continue to follow the basic rules, and these additional requirements
<ul style="list-style-type: none"> • Above the TWA₈ or STEL 	<ul style="list-style-type: none"> • Exposure and medical monitoring, WAC 296-849-12005 through 296-849-12080 and • Exposure control areas, WAC 296-849-13005 through 296-849-13045.
<ul style="list-style-type: none"> • At or below the TWA₈ or STEL and • At or above AL 	<ul style="list-style-type: none"> • Exposure and medical monitoring, WAC 296-849-12005 through 296-849-12080.
<ul style="list-style-type: none"> • Below the AL and STEL 	<ul style="list-style-type: none"> • No additional requirements apply.

Basic Rules

WAC 296-849-110

Section Contents

YOUR RESPONSIBILITY:

To measure and minimize employee exposure to benzene

IMPORTANT:

- To determine which requirements to follow for your work tasks, go to Table 1 in the scope of this chapter, WAC 296-849-100.

Preventive practices	
WAC 296-849-11010	110-2
Exposure control areas	
WAC 296-849-11020	110-3
Exposure evaluations	
WAC 296-849-11030	110-4
Personal protective equipment (PPE)	
WAC 296-849-11040	110-9
Training	
WAC 296-849-11050	110-9
Exposure monitoring observation	
WAC 296-849-11065	110-11
Notification	
WAC 296-849-11070	110-11
Exposure records	
WAC 296-849-11090	110-12



Basic Rules

WAC 296-849-110

Rule

WAC 296-849-11010

Preventive practices

You must

- Make sure containers of benzene in the workplace are labeled, tagged, or marked with this warning:

**DANGER
CONTAINS BENZENE
CANCER HAZARD**



Note:

- You should keep containers tightly covered when not in use to prevent unnecessary exposure and accidental spills.



References:

- Additional requirements are found in other chapters as follows:
 - For spills, leaks, or other releases of benzene, go to Emergency Response, Chapter 296-824 WAC.
 - For labeling go to:
 - The Safety and Health Core Rules, Chapter 296-800 WAC, and find the section, Label containers holding hazardous chemicals, WAC 296-800-17025
 - and**
 - Material Safety Data Sheet and Label Preparation, Chapter 296-839 WAC.

WAC 296-849-11020

Exposure control areas

You must

- Establish temporary or permanent exposure control areas where airborne concentrations of benzene are above, or can be reasonably expected to be above the permissible exposure limits (PELs) for benzene by doing all the following:
 - Post signs at access points to exposure control areas that include this warning:

**DANGER
Benzene
Cancer Hazard
Flammable - No Smoking
Authorized Personnel Only
Respirator Required**

- Distinguish the boundaries of exposure control areas from the rest of the workplace in any way that minimizes employee access.
- Allow only authorized personnel to enter exposure control areas.



Note:

- You may use permanent or temporary enclosures, caution tape, ropes, painted lines on surfaces, or other materials to visibly distinguish exposure control areas or separate them from the rest of the workplace.
- When distinguishing exposure control areas you should consider factors such as:
 - The level and duration of airborne exposure
 - Whether the area is permanent or temporary
 - The number of employees in adjacent areas.



Reference:

- If exposure control areas are established, go to Respirators, WAC 296-849-13045.



Basic Rules

WAC 296-849-110

Rule

WAC 296-849-11030

Exposure evaluations

IMPORTANT:

- When you conduct an exposure evaluation in a workplace where an employee uses a respirator, the protection provided by the respirator isn't considered.
- Following this section will fulfill the requirements to identify and evaluate respiratory hazards found in another chapter, Respiratory Hazards, Chapter 296-841 WAC.

You must

- Conduct an employee exposure evaluation to accurately determine airborne concentrations of benzene by completing Steps 1 through 7 of the exposure evaluation process, each time any of the following apply:
 - No evaluation has been conducted
 - You have up to 30 days to complete an evaluation once benzene is introduced into your workplace
 - Changes have occurred in any of the following areas that may result in new or increased exposures:
 - Production
 - Processes
 - Exposure controls such as ventilation systems or work practices
 - Personnel
 - You have any reason to suspect new or increased exposure may occur
 - Spills, leaks, or other releases have been cleaned up.



Note:

- As part of your exposure evaluation after cleanup, you will make sure exposure monitoring results have returned to prerelease levels.

-Continued-



WAC 296-849-11030 (Continued)

EXPOSURE EVALUATION PROCESS

IMPORTANT:

- If you are evaluating employee exposures during cleaning and repair of barges and tankers that contained benzene:
 - Collect samples that effectively measure benzene concentrations that employees may be exposed to
 - and**
 - Skip to Step 7
- Following the exposure evaluation process isn't necessary when you have documentation conclusively demonstrating benzene exposures for a particular operation and material can't exceed the action level (AL) during any conditions reasonably anticipated.
 - Documentation can be based on data or qualitative information, such as information about:
 - The material
 - How the material is handled
 - The work conditions
 - Retain this documentation for as long as you rely on it.

-Continued-



Basic Rules

WAC 296-849-110

Rule

WAC 296-849-11030 (Continued)

Step 1: Identify all employees who have potential airborne exposure to benzene in your workplace.

Step 2: Identify operations where 15-minute exposures could exceed benzene's short-term exposure limit (STEL) of 5 parts per million (ppm).

- Include operations where it is reasonable to expect high, 15-minute exposures, such as operations where:
 - Tanks are opened, filled, unloaded, or gauged
 - Containers or process equipment are opened
 - Benzene is used as a solvent for cleaning.



Note:

- You may use monitoring devices such as colorimetric indicator tubes or real-time monitors to screen for activities where employee exposure monitoring results could be high.

Step 3: Select employees from those working in the operations you identified in Step 2 who will have their 15-minute exposures measured.

Step 4: Select employees from those identified in Step 1 who will have their 8-hour exposures monitored.

- Make sure the exposures of the employees selected represent 8-hour exposures for all employees identified at Step 1, including each job classification, work area, and shift.



Note:

- A written description of the procedure used for obtaining representative employee exposure monitoring results needs to be kept as part of your exposure records required by this chapter in Exposure records, WAC 296-849-11090. This description can be created while completing Steps 3 through 6 of this exposure evaluation process.

-Continued-



WAC 296-849-11030 (Continued)

Step 5: Determine how you will obtain employee monitoring results.

- Select and use a method that is accurate to $\pm 25\%$, with a confidence level of 95%.



Note:

- Here are examples of methods that meet this accuracy requirement:
 - OSHA Method 12 for air samples, found by going to <http://www.osha.gov/dts/sltc/methods/toc.html>.
 - NIOSH Method 1500, found by going to <http://www.cdc.gov/niosh/homepage.html> and link to the NIOSH Manual of Analytical Methods.

Step 6: Obtain employee exposure monitoring results by collecting air samples representing employees identified at Step 1.

- Collect 15-minute samples from employees selected at Step 3
- Sample at least one shift representative of the 8-hour exposure for each employee selected at Step 4
- Make sure samples are collected from each selected employee's breathing zone
- Collecting area samples is permitted after emergency releases.

-Continued-



Basic Rules

WAC 296-849-110

Rule

WAC 296-849-11030 (Continued)



Note:

- You may use any sampling method that meets the accuracy specified in Step 5. Examples of these methods include:
 - Real-time monitors that provide immediate exposure monitoring results
 - Equipment that collects samples that are sent to a laboratory for analysis.
- The following are examples of methods of monitoring representative of 8-hour exposures:
 - Collect one or more continuous samples, for example, a single 8-hour sample or four 2-hour samples.
 - Take a minimum of 5 brief samples, such as 15-minute samples, during the work shift and at times selected randomly.
- For work shifts longer than 8 hours, monitor the continuous 8-hour portion of the shift expected to have the highest average exposure concentration.

- Step 7:** Have the samples you collected analyzed to obtain monitoring results representing 8-hour and 15-minute exposures.
- Go to the scope of this chapter, WAC 296-849-100, and compare employee exposure monitoring results to the **values** found in Step 2a and follow Step 2b to determine if additional sections of this chapter apply.



Note:

- You may contact your local WISHA consultant for help:
 - Interpreting data or other information
 - Obtaining 8-hour or 15-minute employee exposure monitoring results.
- To contact a WISHA consultant:
 - Go to another chapter, the Safety and Health Core Rules, Chapter 296-800 WAC, and find the resources section, and under "other resources," find service location for Labor and Industries.



WAC 296-849-11040

Personal protective equipment (PPE)

You must

- Make sure employees use appropriate PPE as protection from skin or eye contact with liquid benzene.



Note:

- Harmful amounts of benzene can enter the body through skin and eye contact.



Reference:

- To see additional personal protective equipment requirements, go to the Safety and Health Core Rules, Chapter 296-800 WAC.

WAC 296-849-11050

Training

You must

- Provide training and information to employees:
 - At the time of initial assignment to a work area where benzene is present
 - and**
 - At least every 12 months after initial training for employees exposed to airborne concentrations at or above the action level (AL) of 0.5 parts per million (ppm).

-Continued-



Basic Rules

WAC 296-849-110

Rule

WAC 296-849-11050 (Continued)

- Make sure training and information includes all of the following:
 - Specific information on benzene for each hazard communication training topic. For the list of hazard communication training topics, go to the Safety and Health Core Rules, Chapter 296-800 WAC, and find Inform and train your employees about hazardous chemicals in your workplace, WAC 296-800-17030
and
 - An explanation of the contents of each of the following and guidance about where to find a copy:
 - This chapter.
 - The following found in another chapter, the General Occupational Health Standards, Chapter 296-62 WAC:
 - The substance safety data sheet--benzene, found in WAC 296-62-07525, Appendix A
 - The substance technical guidelines--benzene, found in WAC 296-62-07527, Appendix B
 - The medical surveillance guidelines for benzene, found in WAC 296-62-07529, Appendix C
and
 - A description of the medical evaluation requirements of this chapter found in:
 - Medical evaluations, WAC 296-849-12030
and
 - Medical removal, WAC 296-849-12050.



Reference:

- To see additional training and information requirements in other chapters, go to the:
 - Respirators rule, Chapter 296-842 WAC, and find the Training section, WAC 296-842-16005.
 - Safety and Health Core Rules, Chapter 296-800 WAC, and find the section titled, Inform and train your employees about hazardous chemicals in your workplace, WAC 296-800-17030.

Basic Rules

WAC 296-849-110

Rules

WAC 296-849-11065

Exposure monitoring observation

You must

- 1) Provide affected employees and their designated representatives an opportunity to observe exposure monitoring during Step 6 of the exposure evaluation process found in Exposure evaluations, WAC 296-849-11030.
- 2) Make sure observers who enter areas with benzene exposure:
 - Are provided with and use the same protective clothing, respirators, and other personal protective equipment (PPE) that employees working in the area are required to use
 - and**
 - Follow safety and health requirements that apply.

WAC 296-849-11070

Notification

You must

- Provide written notification of exposure monitoring results to the employees represented by your exposure evaluation within 5 business days after the monitoring results become known to you.

In addition, when employee exposure monitoring results are above a permissible exposure limit (PEL), provide written notification of all of the following within 15 business days after these exposure monitoring results become known to you:

- Corrective actions being taken and a schedule for completion
- and**
- Any reason why exposures can't be lowered to below the PELs for benzene.

-Continued-



Basic Rules

WAC 296-849-110

Rule

WAC 296-849-11070 (Continued)



Note:

- You can notify employees either individually or post the notifications in areas readily accessible to affected employees.
- Posted notification may need specific information that allows affected employees to determine which monitoring results apply to them.
- Notification may be in any written form, such as handwritten or e-mail.
- Notification may be limited to the required information, such as exposure monitoring results.
- When notifying employees about corrective actions, your notification may refer them to a separate document that's available and provides the required information.

WAC 296-849-11090

Exposure records

You must

- Establish and keep complete and accurate records for all exposure monitoring conducted under this chapter. Make sure the record includes at least:
 - The name, Social Security number, or other unique identifier, and job classification of the employee sampled and all other employees represented by the sampled employee.
 - The type of respirator worn, if any.
 - A description of the methods used to obtain exposure monitoring results.
 - A description of the procedure used to obtain representative employee exposure monitoring results.
 - The date, number, duration, and the result of each sample taken.

-Continued-



WAC 296-849-11090 (Continued)



Note:

- It is useful to record any personal protective equipment worn by the employee, in addition to the type of respirator worn.

You must

Keep exposure monitoring records for at least 30 years.



Reference:

- To see additional requirements for employee exposure records including access, and transfer requirements, go to another chapter, Employee Medical and Exposure Records, Chapter 296-802 WAC.
- Exposure monitoring records need to be kept longer than 30 years for employees participating in medical monitoring. Go to Medical records, WAC 296-849-12080, found within this chapter.



Exposure and Medical Monitoring

WAC 296-849-120

Section Contents

YOUR RESPONSIBILITY:

To detect any significant changes in employee health and exposure monitoring results

IMPORTANT:

- These sections apply when employee exposure monitoring results are either:
 - At or above the action level (AL) of 0.5 parts per million (ppm) for benzene
 - or**
 - Above either of the permissible exposure limits for benzene.

Periodic exposure evaluations	
WAC 296-849-12010	120-2
Medical evaluations	
WAC 296-849-12030	120-4
Medical removal	
WAC 296-849-12050	120-13
Medical records	
WAC 296-849-12080	120-17



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12010

Periodic exposure evaluations



Exemption:

- Periodic exposure evaluations aren't required if exposure monitoring results conducted to fulfill requirements in Exposure evaluation, WAC 296-849-11030, are below the action level (AL) and short-term exposure limit (STEL).

You must

Obtain employee exposure monitoring results as specified in Table 3, by repeating Steps 3, 4, 6, and 7 of the exposure evaluation process found within this chapter, in Exposure evaluations, WAC 296-849-11030.



Note:

- If you document that one work shift consistently has higher exposure monitoring results than another for a particular operation, then you can limit sample collection to the work shift with higher exposures and use results to represent all employees performing the operation on other shifts.

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12010 (Continued)

Table 3
Periodic Exposure Evaluation Frequencies

If exposure monitoring results	Then
Are between the: <ul style="list-style-type: none">• AL of 0.5 ppmand• 8-hour-time-weighted average (TWA₈) of 1 ppm	<ul style="list-style-type: none">• Conduct additional exposure evaluations at least every 12 months for the employees represented by the monitoring results
<ul style="list-style-type: none">• Are above the TWA₈	<ul style="list-style-type: none">• Conduct additional exposure evaluations at least every 6 months for the employees represented by the monitoring results.
<ul style="list-style-type: none">• Have decreased to a concentration between the AL and TWA₈and• The decrease is demonstrated by 2 consecutive exposure evaluations, made at least 7 days apart	<ul style="list-style-type: none">• You may decrease your evaluation frequency to every 12 months for employees represented by the monitoring results.
<ul style="list-style-type: none">• Are above the short-term exposure limit (STEL) of 5 ppm	<ul style="list-style-type: none">• Repeat as often as necessary to evaluate employee exposure
<ul style="list-style-type: none">• Have decreased to below the AL and the STELand• The decrease is demonstrated by 2 consecutive evaluations, made at least 7 days apart	<ul style="list-style-type: none">• You may stop periodic exposure evaluations for employees represented by the monitoring results

Exposure and
Medical Monitoring



Exposure and Medical Monitoring

WAC 296-849-120

Rule

IMPORTANT:

- Medical evaluations conducted under this section will satisfy the medical evaluation requirement found in Respirators, Chapter 296-842 WAC.

You must

- Provide the relevant medical follow-up specified in Tables 4 and 5 to any employee exposed to benzene during an emergency.
- Make medical evaluations available to current employees who meet the following criteria:
 - Potential or actual exposure to benzene at or above the action level (AL) for at least 30 days in any 12-month period.
 - Potential or actual exposure to benzene at or above either permissible exposure limit (PEL) for at least 10 days in a 12-month period.
 - Past exposure to concentrations above 10 ppm benzene for at least 30 days in a 12-month period before November 11, 1988.
 - Current or past work as a tire building machine operator using solvents containing more than 0.1% benzene during tire building operations.
- Make medical evaluations available at no cost to employees.
 - Pay all costs, including travel costs and wages associated with any time spent outside of the employee's normal work hours

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12030 (Continued)

- Make medical evaluations available at reasonable times and places
 - Make medical evaluations available by completing Steps 1 through 6 of the medical evaluation process for each employee covered.



Note:

- Employees who wear respirators need to be medically evaluated to make sure the respirator won't harm them, before they are assigned work in areas requiring respirators. Employees who decline to receive medical examination and testing to monitor for health effects caused by benzene aren't excluded from receiving a separate medical evaluation for a respirator use.
- If employers discourage participation in medical monitoring for health effects caused by benzene, or in any way interfere with an employee's decision to continue with this program, this interference may represent unlawful discrimination under RCW 49.17.160, Discrimination against employee filing, instituting proceeding, or testifying prohibited--Procedure--Remedy.



Helpful tool:

Declination form for nonemergency related medical evaluations

You may use this optional form to document employee decisions to decline participation in the medical evaluation process for exposure to benzene.

-Continued-

<http://www.lni.wa.gov/>

Exposure and
Medical Monitoring



120-5
03/05

Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12030 (Continued)

MEDICAL EVALUATION PROCESS

- Step 1:** Identify employees who qualify, as stated above, for medical evaluations.
- Step 2:** Make medical evaluations available for employees identified in Step 1 at the following times:
- Initially, before the employee starts a job or task assignment where benzene exposure will occur.
 - Every 12 months from the initial medical evaluation.
 - Whenever the employee develops signs or symptoms commonly associated with toxic benzene exposure.
 - After benzene exposure from an emergency.
- Step 3:** Select a licensed health care professional (LHCP) who will conduct or supervise medical evaluations and make sure:
- Individuals who conduct pulmonary function tests have completed a training course in spirometry sponsored by an appropriate governmental, academic, or professional institution, if they aren't licensed physicians
- and**
- Your LHCP uses an accredited laboratory, such as one accredited by a nationally or state-recognized organization, to conduct laboratory tests.
- Step 4:** Make sure the LHCP receives all of the following before the medical evaluation is performed:
- A copy of:
 - This chapter
 - The following information found in the General Occupational Health Standards, Chapter 296-62 WAC:
 - Appendix A, the Substance safety data sheet--benzene, found in WAC 296-62-07525.

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12030 (Continued)

- Appendix B, the Substance technical guidelines--benzene, found in WAC 296-62-07527.
 - Appendix C, the Medical surveillance guidelines for benzene, found in WAC 296-62-07529.
- A description of the duties of the employee being evaluated and how these duties relate to benzene exposure.
- The anticipated or representative exposure monitoring results for the employee being evaluated.
- A description of the personal protective equipment (PPE) each employee being evaluated uses or will use.
- Information from previous employment-related examinations when this information isn't available to the examining LHCP.
- Instructions that the written opinions the LHCP provides, be **limited to** the following information:
 - Specific records, findings, or diagnosis relevant to the employee's ability to work around benzene.
 - The occupationally relevant results from examinations and tests.
 - A statement about whether or not medical conditions were found that would increase the employee's risk for impairment from exposure to benzene.
 - Any recommended limitations for benzene exposure.
 - Whether or not the employee can use respirators and any recommended limitations for respirator or other PPE use.
 - A statement that the employee has been informed of medical results and medical conditions caused by benzene exposure requiring further explanation or treatment.

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12030 (Continued)

- Step 5:** Provide the medical evaluation to the employee. Make sure it includes the content listed in Table 4, Content of medical evaluations, and Table 5, Medical follow-up requirements.
- Step 6:** Obtain the LHCP's written opinion for each employee's medical evaluation and give a copy to the employee within 15 days of the evaluation date.
- Make sure the written opinion is limited to the information specified for written opinions in Step 4.



Note:

- If the written opinion contains specific findings or diagnoses unrelated to occupational exposure, send it back and obtain a revised version without the additional information.

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12030 (Continued)

IMPORTANT:

- These tables apply when conducting medical evaluations, including medical follow-up for employees exposed to benzene during emergencies

Table 4
Content of Medical Evaluations

When conducting	Include
An initial evaluation	<ul style="list-style-type: none"> • A detailed history including: <ul style="list-style-type: none"> – Past work exposure to benzene or other hematological toxins – Exposure to marrow toxins outside of current employment – Exposure to ionizing radiation – Family history of blood dyscrasias including hematological neoplasms – History of blood dyscrasias including genetic hemoglobin abnormalities, bleeding abnormalities, and abnormal function of formed blood elements – History of renal or liver dysfunction – History of medications routinely taken • A complete physical examination: <ul style="list-style-type: none"> – Include a pulmonary function test and specific evaluation of the cardiopulmonary system if the employee is required to use a respirator for at least 30 days a year • A complete blood count including a: <ul style="list-style-type: none"> – Leukocyte count with differential – Quantitative thrombocyte count – Hematocrit – Hemoglobin – Erythrocyte count and indices (MCV, MCH, MCHC)

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12030 (Continued)

Table 4 -- Content of Medical Evaluations (Continued)

	<ul style="list-style-type: none"> Additional tests the examining LHCP determines are necessary based on alterations in the components of the blood or other signs that may be related to benzene exposure Medical follow-up as required in Table 5
<ul style="list-style-type: none"> Annual evaluations 	<ul style="list-style-type: none"> An updated medical history covering: <ul style="list-style-type: none"> Any new exposure to potential marrow toxins Changes in medication use Any physical signs associated with blood disorders A complete blood count including a: <ul style="list-style-type: none"> Leukocyte count with differential Quantitative thrombocyte count Hematocrit Hemoglobin Erythrocyte count and indices (MCV, MCH, MCHC). Additional tests that the examining LHCP determines necessary, based on alterations in the components of the blood or other signs that may be related to benzene exposure A pulmonary function test and specific evaluation of the cardiopulmonary system every 3 years if the employee is required to use a respirator for at least 30 days a year <p>Medical follow-up as required in Table 5</p>
<ul style="list-style-type: none"> Evaluations triggered by employee signs and symptoms commonly associated with the toxic effects of benzene exposure 	<ul style="list-style-type: none"> An additional medical examination that addresses elements the examining LHCP considers appropriate
<ul style="list-style-type: none"> Evaluations triggered by employee exposure during an emergency 	<ul style="list-style-type: none"> A urinary phenol test performed on the exposed employee's urine sample within 72 hours of sample collection <ul style="list-style-type: none"> The urine sample must be collected at the end of the work shift associated with the emergency The urine specific gravity must be corrected to 1.024 <p>Medical follow-up as required in Table 5</p> <p>Reference: Employees who aren't covered by medical evaluation requirements in this chapter may be covered by medical evaluation requirements in other chapters such as Emergency Response, Chapter 296-824 WAC.</p>

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12030 (Continued)

Table 5
Medical Follow-up Requirements

If	Then
<ul style="list-style-type: none">The complete blood count test result is normal	<ul style="list-style-type: none">No further evaluation is required
<ul style="list-style-type: none">The complete blood count test shows any of the following abnormal conditions:<ul style="list-style-type: none">A leukocyte count less than 4,000 per mm³ or an abnormal differential countor<ul style="list-style-type: none">A thrombocyte (platelet) count that is either<ul style="list-style-type: none">More than 20% below the employee's most recent valuesor<ul style="list-style-type: none">Outside the normal limit (95% C.I.) according to the laboratoryor<ul style="list-style-type: none">The hematocrit or hemoglobin level is either of the following, and can't be explained by other medical reasons:<ul style="list-style-type: none">Below the normal limit (outside the 95% C.I.), as determined by the laboratory for the particular geographical areaor<ul style="list-style-type: none">Persistently decreasing compared to the employee's preexposure levels.	<ul style="list-style-type: none">Repeat the complete blood count within 2 weeks:<ul style="list-style-type: none">If the abnormal condition persists, refer the employee to a hematologist or an internist for follow-up medical examination and evaluation, unless the LHCP has good reason to believe it's unnecessaryThe hematologist or internist will determine what follow-up tests are necessaryand<ul style="list-style-type: none">Follow the requirements found in Medical removal, WAC 296-849-12050

-Continued-

Exposure and
Medical Monitoring



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12030 (Continued)

Results from the urinary phenol test conducted during an emergency evaluation show phenol levels less than 75 mg/L	<ul style="list-style-type: none">• No further evaluation is required.
Results from the urinary phenol test conducted during an emergency evaluation show phenol levels equal or more than 75 mg/L	<ul style="list-style-type: none">• Provide a complete blood count monthly for 3 months. Include a:<ul style="list-style-type: none">– Leukocyte count with differential– Thrombocyte count– Erythrocyte count <p>and</p> <ul style="list-style-type: none">• If any of the abnormal conditions previously listed in this table for complete blood count results are found:<ul style="list-style-type: none">– Provide the employee with periodic examinations, if directed by the LHCP <p>and</p> <ul style="list-style-type: none">– Refer the employee to a hematologist or an internist for follow-up medical examination and evaluation unless the LHCP has good reason to believe a referral is unnecessary <p>and</p> <ul style="list-style-type: none">– Follow the requirements found in Medical removal, WAC 296-849-12050 <p>and</p> <ul style="list-style-type: none">– The hematologist or internist will determine what follow-up tests are necessary.



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12050

Medical removal

IMPORTANT:

- This section applies when an employee is referred to a hematologist or an internist for follow-up medical examination and evaluation required in Table 5, Medical Follow-up Requirements, found in Medical evaluations, WAC 296-849-12030.

You must

- 1) Remove the employee from areas where benzene exposure is above the action level (AL) by doing either of the following:
 - Transfer the employee to a job currently available that:
 - The employee qualifies for, or could be trained for in a short period of time**and**
 - Will keep the employee's exposure to benzene as low as possible and never above the AL
 - or**
 - Remove the employee from the workplace until either:
 - A job becomes available that:
 - The employee qualifies for, or could be trained for in a short period of time**and**
 - Will keep the employee's exposure to benzene as low as possible and never above the AL
 - or**
 - The employee is returned to work or permanently removed from benzene exposure as determined by completing the medical evaluation process for removed employees.

-Continued-

<http://www.lni.wa.gov/>

Exposure and
Medical Monitoring



120-13

03/05

Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12050 (Continued)

You must

- 2) Maintain the employee's current pay rate, seniority, and other benefits.



Note:

- If you must provide medical removal benefits and the employee will receive compensation for lost pay from other sources, you may reduce your medical removal benefit obligation to offset the amount provided by these sources. Examples of other sources are:
 - Public or employer-funded compensation programs
 - Employment by another employer, made possible by the employee's removal.

You must

- 3) Complete Steps 1 through 4 of the medical evaluation process for removed employees, within 6 months of the date the licensed health care professional (LHCP) refers an employee to a hematologist or internist for follow-up.
 - Make sure all examinations and evaluations are provided at no cost to the employee.
 - Make examinations and evaluations available at reasonable times and places
 - and**
 - Pay for travel costs and wages, including any time spent outside of the employee's normal work hours.

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12050 (Continued)

MEDICAL EVALUATION PROCESS FOR REMOVED EMPLOYEES

Step 1: Make sure the following is provided to the hematologist or internist:

- The information you provided to the LHCP in Step 4 of Medical evaluations, WAC 296-849-12030
- The employee's medical record as described in Medical records, WAC 296-849-12080.



Note:

- The examining LHCP may provide this information for you.

Step 2: Provide the employee an examination and evaluation by a hematologist **or** internist.

- When the examination and evaluation is completed, you and the employee must be informed, in writing, of the referring LHCP's decision to continue or end the employee's removal from benzene exposure.
- Include the following in the LHCP's decision if removal of the employee continues:
 - The expected time period for removal to continue**and**
 - Requirements for future medical examinations to review the decision.
- If the LHCP recommends the employee **end removal** and return to the usual job with benzene exposure, **skip Steps 3 and 4.**

-Continued-



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12050 (Continued)

Step 3: Provide further medical examination and evaluation to the employee when the LHCP's decision from Step 2 informs you that medical removal must continue.



Note:

- During this step the LHCP, in consultation with the hematologist or internist, decides whether the employee:
 - May return to their usual job
- or**
- Should be permanently removed from exposures that exceed the AL.
- If the LHCP recommends the employee return to their usual job, skip Step 4.

Step 4: When the LHCP recommends permanent removal for the employee, make sure all the following conditions are met:

- The employee has an opportunity to transfer to another job that is currently available (or will become available)
- The job is one the employee qualifies for, or could be trained for in a short period of time
- There is no reduction in the employee's current pay rate, seniority, and other benefits
- The employee's benzene exposures will be as low as possible, but never more than the AL.



Exposure and Medical Monitoring

WAC 296-849-120

Rule

WAC 296-849-12080

Medical records

IMPORTANT:

- This section applies when a medical evaluation is performed, or any time a medical record is created for an employee exposed to benzene.

You must

- Establish and maintain complete and accurate medical records for each employee receiving a medical evaluation and make sure the records include **all** the following:
 - The employee's name and Social Security number, or other unique identifier
 - A copy of the licensed health care professional's (LHCP's) written opinions including written decisions and recommendations for the employee removed from exposure
 - A copy of the information required in Step 4 of the Medical evaluation process, found in WAC 296-849-12030, **except** for the copy of this chapter and the appendices listed.
- Maintain medical evaluation records for the duration of employment plus 30 years.



Note:

- Your medical provider may keep these records for you. Other medical records such as an employee's medical history, need to be kept as a confidential record by the medical provider and accessed only with the employee's consent.



Reference:

- To see additional employee medical record requirements, including access and transfer requirements, go to another chapter, Employee Medical and Exposure Records, Chapter 296-802 WAC.



Notes

Rules for Exposure Control Areas

WAC 296-849-130

Section Contents

YOUR RESPONSIBILITY:

To protect employees from exposure to benzene by using feasible exposure controls and appropriate respirators

IMPORTANT:

- These sections apply when existing or potential employee exposure monitoring results are above either of the following permissible exposure limits (PELs):
 - The 8-hour time-weighted average (TWA₈) of 1 part per million (ppm)
 - or**
 - The 15-minute short-term exposure limit (STEL) of 5 ppm.

Exposure control plan

WAC 296-849-13005 130-2

Exposure controls

WAC 296-849-13020 130-3

Respirators

WAC 296-849-13045 130-5



Rules for Exposure Control Areas

WAC 296-849-130

Rule

WAC 296-849-13005

Exposure control plan



Exemption:

- This section doesn't apply to the cleaning and repair of barges and tankers that contained benzene.

You must

- Establish and implement a written exposure control plan for exposure control areas that include a schedule for developing and implementing feasible exposure controls to reduce benzene exposure to, or below, the PELs.



Reference:

- To see examples of exposure controls, go to Respiratory Hazards, Chapter 296-841 WAC, and find Table 1 in Control employee exposure, WAC 296-841-20010.



Note:

- Respirators and other personal protective equipment (PPE) help protect employees from exposures, but are **not** substitutes for feasible exposure controls.

You must

- Review and update your exposure control plan as needed, based on the most recent exposure evaluation results
- Provide a copy of your exposure control plan to affected employees and their designated representatives when they ask to review or copy it.

Rules for Exposure Control Areas

WAC 296-849-130

Rule

WAC 296-849-13020

Exposure controls

IMPORTANT:

- Respirators and other personal protective equipment (PPE) do **not** substitute for feasible exposure controls.

You must

- Use feasible exposure controls to reduce exposures, as specified in Table 6.



Reference:

- To see examples of exposure controls, go to Respiratory Hazards, Chapter 296-841 WAC, and find Table 1 in Control employee exposures, WAC 296-841-20010.

-Continued-



Rules for Exposure Control Areas

WAC 296-849-130

Rule

WAC 296-849-13020 (Continued)

Table 6
Exposure Control Requirements

If	Then you must use feasible controls to
You have operations where employees clean and repair barges or tankers which have contained benzene	Keep all employee exposure concentrations below 10 parts per million (ppm).
You can document that benzene is used for less than 30 days a year in the workplace	Reduce 8-hour employee exposure monitoring results to a time-weighted average of 10 ppm or less. Note: If employee exposure monitoring results are between 1 and 10 ppm, you are permitted to use respirators or a combination of respirators and feasible controls to protect employees.
Employees are exposed to benzene above a PEL for at least 30 days a year	Reduce 8-hour employee exposure concentrations to the TWA_8 of 1 ppm or less and Reduce 15-minute employee exposure concentrations to the STEL of 5 ppm or less.

Rules for Exposure Control Areas

WAC 296-849-130

Rule

WAC 296-849-13045

Respirators

IMPORTANT:

- These requirements are in addition to the requirements found in other chapters:
 - Respiratory Hazards, Chapter 296-841 WAC
 - Respirators, Chapter 296-842 WAC

You must

- Provide respirators and require that employees use them in circumstances where exposure is above either permissible exposure limit (PEL) for benzene, including any of the following circumstances:
 - Employees are in an exposure control area
 - Feasible exposure controls are being put in place
 - Where you determine that exposure controls aren't feasible
 - Feasible exposure controls don't reduce exposures to, or below, a PEL.
 - Emergencies
- Meet these requirements to protect employees from benzene exposure above a PEL:
 - Limit selection of escape respirators to either:
 - A full-facepiece organic vapor gas mask
 - A full-facepiece self-contained breathing apparatus (SCBA)
 - A hood-style SCBA that operates in positive-pressure mode.

-Continued-



Rules for Exposure Control Areas

WAC 296-849-130

Rule

WAC 296-849-13045 (Continued)

- Make sure respirator cartridges or canisters are replaced at the beginning of each work shift, or sooner if their service life has expired
- Make sure canisters on gas masks and powered air-purifying respirators (PAPRs) have a minimum service life of 4 hours when tested under these conditions:
 - A benzene concentration of 150 ppm
 - A temperature of 25°C
 - A relative humidity of 85%
 - A flow rate of one of the following:
 - 64 liters per minute (lpm) for nonpowered air-purifying respirators
 - 115 lpm for tight-fitting PAPRs
 - 170 lpm for loose-fitting PAPRs
- Provide an employee a respirator with low breathing resistance, such as a PAPR or an air-line respirator when the:
 - Employee can't use a negative-pressure respirator

and

 - A licensed health care professional's (LHCP's) written opinion allows this type of respirator.

Benzene

WAC 296-849-190

Definitions

Action level

An airborne concentration of benzene of 0.5 parts per million (ppm) calculated as an 8-hour time-weighted average.

Authorized personnel

Individuals specifically permitted by the employer to enter the exposure control area to perform necessary duties, or to observe employee exposure evaluations as a designated representative.

Benzene

Liquid benzene, benzene vapor, and benzene in liquid mixtures and the vapors released by these liquids.

The chemical abstract service (CAS) registry number for benzene is 71-43-2. CAS numbers are internationally recognized and used on material safety data sheets (MSDSs) and other documents to identify substances. For more information see <http://www.cas.org/about>.

Breathing zone

The space around and in front of an employee's nose and mouth, forming a hemisphere with a 6- to 9-inch radius.

Bulk wholesale storage facility

Any bulk terminal or bulk plant where fuel is stored before its delivery to wholesale customers.

Container

Any container, except for pipes or piping systems, that contains benzene. It can be any of the following:

- Barrel
- Bottle
- Can
- Cylinder
- Drum
- Reaction vessel
- Storage tank





Benzene

WAC 296-849-190

Definitions

Day

Any part of a calendar day.

Designated representative

Any of the following:

- Any individual or organization to which an employee gives written authorization
- A recognized or certified collective bargaining agent without regard to written employee authorization

or

- The legal representative of a deceased or legally incapacitated employee.

Emergency

Any event that could or does result in the unexpected significant release of benzene.

Examples of emergencies include equipment failure, container rupture, or control equipment failure.

Exposure

The contact an employee has with benzene, whether or not protection is provided by respirators or other personal protective equipment (PPE). Contact can occur through various routes of entry such as inhalation, ingestion, skin contact, or skin absorption.

Licensed health care professional (LHCP)

An individual whose legally permitted scope of practice allows him or her to provide some or all of the health care services required for medical evaluations.

Permissible exposure limits (PELs)

PELs are employee exposures to toxic substances or harmful physical agents that must not be exceeded. PELs are also specified in various WISHA rules found in other chapters. The PELs for benzene are the:

- 8-hour time-weighted average (TWA₈) of 1 part per million (ppm)

and

- 15-minute short-term exposure limit (STEL) of 5 ppm.

Benzene

WAC 296-849-190

Definitions

Short-term exposure limit (STEL)

An exposure limit averaged over a 15-minute period that must not be exceeded during any part of an employee's workday.

Time-weighted average (TWA₈)

An exposure limit averaged over an 8-hour period that must not be exceeded during an employee's workday.

Vapor control systems

Equipment that controls the vapor displaced when chemicals are loaded and unloaded from truck or storage tanks. It also processes or balances the vapor back into the truck or storage tanks.



Benzene

Chapter 296-849 WAC

Resources

Helpful Tools

Declination Form for nonemergency related medical evaluations.....R-3

Resources



Notes

Declination Form for Nonemergency Related Medical Evaluations (Optional)

Use with Benzene, Chapter 296-849 WAC

Employer _____

I understand that because of my occupational exposure to benzene, I may be at risk for serious health effects including various blood disorders such as leukemia; an irreversible and fatal disease. I also understand that without medical examinations and tests, I may not be able to detect the onset of blood disorders.

You have given me the opportunity to receive medical examination and testing for potential health effects from benzene, at no cost to me. However, I decline to receive this medical examination and testing at this time.

I understand that by declining medical examination and testing, I continue to be at risk for leukemia and other health effects related to benzene exposure, without the benefit of early detection made possible by medical examination and testing.

I understand that I must have a medical evaluation to wear a respirator and without such an evaluation I cannot wear a respirator as part of my job. I also understand that declining to receive medical examination and testing for health effects from benzene exposures does **not** exclude me from receiving a separate medical evaluation for respirator use.

If, in the future, I continue to have benzene exposure and decide to receive medical examination and testing, I will be given the opportunity to receive them at no cost to me.

Employee's Name (Print)

Employee's Signature

Date

Resources



Benzene

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Statutory Authority

296-849-100 Scope.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-100, filed 12/21/04, effective 03/01/05.]

296-849-110 Basic rules.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-110, filed 12/21/04, effective 03/01/05.]

296-849-11010 Preventive practices.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-11010, filed 12/21/04, effective 03/01/05.]

296-849-11020 Exposure control areas.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-11020, filed 12/21/04, effective 03/01/05.]

296-849-11030 Exposure evaluations.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-11030, filed 12/21/04, effective 03/01/05.]

296-849-11040 Personal protective equipment.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-11040, filed 12/21/04, effective 03/01/05.]

296-849-11050 Training.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-11050, filed 12/21/04, effective 03/01/05.]

296-849-11065 Exposure monitoring observation.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-11065, filed 12/21/04, effective 03/01/05.]

296-849-11070 Notification.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-11070, filed 12/21/04, effective 03/01/05.]

296-849-11090 Exposure records.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-11090, filed 12/21/04, effective 03/01/05.]

296-849-120 Exposure and medical monitoring.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-120, filed 12/21/04, effective 03/01/05.]

296-849-12010 Periodic exposure evaluations.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-12010, filed 12/21/04, effective 03/01/05.]

296-849-12030 Medical evaluations

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-12030, filed 12/21/04, effective 03/01/05.]

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296-849-12050 Medical removal.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-12050, filed 12/21/04, effective 03/01/05.]

296-849-12080 Medical records.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-12080, filed 12/21/04, effective 03/01/05.]

296-849-130 Rules for exposure control areas.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-130, filed 12/21/04, effective 03/01/05.]

296-849-13005 Exposure control plan.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-13005, filed 12/21/04, effective 03/01/05.]

296-849-13020 Exposure controls.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-13020, filed 12/21/04, effective 03/01/05.]

296-849-13045 Respirators.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-13045, filed 12/21/04, effective 03/01/05.]

296-849-190 Definitions.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 05-01-172 (Order 04-12), § 296-849-190, filed 12/21/04, effective 03/01/05.]